EXPLORING THE SHAVELLIAN BOUNDARY: VIOLATIONS FROM JUDGMENT-PROOFING, MINORITY RIGHTS, AND SIGNALING

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I. INTRODUCTION

Economic analysis of law used to be subject to arrest by redistributive objections. Despite the efficiency that an economically optimal rule had, the objection could be raised that it also had undesirable consequences for the distribution of wealth. A thesis by Professor Shavell, later repeated with Kaplow, overcame this objection by showing that using an optimal tax for redistribution is superior to altering a non-tax, or substantive, rule to achieve the same redistribution.[1] When either an optimal substantive rule or an optimal tax is altered, the change induces a reduction of work in favor of leisure (the "chilling effect"). However, when a substantive rule is altered it also distorts the market for the activity that is the subject of the rule. This conclusion was instrumental for the success of economic analysis of law because it enabled economic analysis, as a normative tool, to proceed without being hampered by objections about the distributional effects of its proposals. Shavell's thesis can also be interpreted as identifying a boundary of proper objectives for substantive rules. Policy makers are cautioned not to use substantive rules to achieve redistributive

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[1] Steven Shavell, *A Note on Efficiency vs. Distributional Equity in Legal Rulemaking: Should Distributional Equity Matter Given Optimal Income Taxation?* 71 AM. ECON. REV 414 (1981). *See also* Louis Kaplow & Steven Shavell, *Why the Legal System is Less Efficient than the Income Tax in Redistributing Income*, 23 J. LEG. STUDIES 667 (1994) [hereinafter *Redistributing*]; and Louis Kaplow & Steven Shavell, *Should Legal Rules Favor the Poor? Clarifying the Role of Legal Rules and the Income Tax in Redistributing Income*, 29 J. LEG. STUDIES 821 (2000) [hereinafter *Clarifying*].

goals. The thesis therefore establishes a taboo, an option that rule designers must ignore, a boundary that they must not cross.[2]

Several law and economics scholars have explicitly taken the opposite position, and have defended the pursuit of redistributive goals with non-tax rules.[3] The literature is rich and varied. Some argue, for example, that redistribution beyond that which maximizes aggregate welfare is desirable.[4] Others argue that utility can be compared between persons, and that this allows efficient distributional outcomes.[5] Still others argue the more general point that distributional goals can be pursued more effectively with substantive legal rules rather than with tax rules.[6] This paper follows this last path.

Shavell and advocates of his theory acknowledge that substantive rules may, on rare occasions, be superior to an optimal tax, but they insist that this does not undermine their thesis that tax rules are the generally preferable method of redistribution.[7] This article explores the Shavellian boundary and describes three types of substantive rules that are exceptions to it (one might refer to rules that violate the Shavellian boundary as exo-Shavellian[8]). The exceptional rules are substantive rules that are motivated

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[2] That distribution must not drive the design of rules does not mean that rule design must avoid distributional consequences. Take the goal, for example, of minimizing the cost of accidents by designing tort rules. Suppose, also, that the rule that minimizes the cost of accidents also has desirable distributional consequences, while a second rule induces slightly larger costs of accidents and has no distributional consequences. The Shavell boundary does not imply that the second rule should be preferred.

[3] *See, e.g.*, Mathew D. Adler & Eric A. Posner, *Re-thinking Cost-Benefit Analysis*, 109 YALE L.J. 165, 204-09 (1999) (arguing that utility can be compared between persons, which leads to a validity of distributional concerns); Christine Jolls, *Behavioral Economic Analysis of Redistributive Legal Rules*, 51 VAND. L. REV. 1653, 1656 (1998) (arguing that cognitive errors may indicate that distributional goals can be pursued more effectively with non-tax legal rules rather than with tax rules). *See also* Nicholas L. Georgakopoulos, *Solutions to the Intractability of Distributional Concerns*, 33 RUTGERS L. J. 279 (2002) (offering several candidates of rules that violate the Shavellian boundary). Some in the law and economics community also argue that redistribution beyond that which maximizes aggregate welfare is desirable, *see* Chris W. Sanchirico, *Deconstructing the New Efficiency Rationale*, 86 CORNELL L. REV. 1003 (2001) (arguing that infinitesimal adjustments in favor of redistribution do not violate the Shavell thesis); *see also* Ronen Avraham & Kyle D. Logue, *Redistributing Optimally: Of Tax Rules, Legal Rule and Insurance*, 56 Tax L. Rev. 157 (2003). In his plenary address to the American Association of Law Schools, Judge Guido Calabresi addressed the issue of altruism as a utility enhancing strategy for inducing people to like the altruist and expanded to social altruism through (possibly sub-optimal) redistributive schemes. *See* Guido Calabresi, *The Lawyer As Institutional Empiricist: The Case of Law and Economics*, AALS Annual Meetings Proceedings (2006).

[4] *See, e.g.*, Calabresi, *supra* note 3.

[5] *See, e.g.*, Adler & Posner, *supra* note 3.

[6] *See,. e.g.*, Jolls and Avraham & Logue, *supra* note 3.

[7] *Redistributing*, *supra* note 1, at 680-81.

[8] The "exo" prefix originates from the Greek ἔξω and means "out," so that exo-Shavellian rules are those that are outside the Shavellian boundary. Compare exogamy (marrying outside a group),

by redistributive goals and are superior to a substitute based on optimal taxation. The redistribution that the change of the rule provides could be provided by the tax system with an incremental, optimal tax. The "optimal tax substitute" of a substantive rule is the incremental, optimal tax that funds the same redistribution, paired, if necessary, with a substantive rule that induces the same substantive outcome.

The distinction between tax rules and substantive rules may appear simple on the surface, but it hides a complication. To a large degree, the legal system can be replicated using tax rules alone. Taxes that turn on "substantive" events, such as injuries or breaches of contracts, can be designed that produce incentives identical to those of all substantive rules about such matters as torts or contracts. Therefore, we must establish a definition of "tax rules" that distinguishes them from rules that have non-tax effects despite being ostensibly taxes. Yet, the definition must be broad enough to include not only taxes paid to the fiscus, but also benefits received from it, such as subsidies. Also, even though this analysis rests on optimal income taxation, the definition should include taxes on the basis of transactions, such as sales taxes.

A *tax rule* is a rule that produces a monetary obligation to (or monetary entitlement from) the government as a result of income or transactions and has no direct non-monetary effect. All rules that involve direct non-monetary obligations or entitlements and all rules that, despite involving only monetary obligations or entitlements, also have direct non-monetary effects are *substantive rules*. This definition means that some rules within the tax code may be considered substantive rules—particularly if they involve, beyond the payment of a tax or receipt of a subsidy, a physical obligation or entitlement or require the creation of additional information, such as the publication of the taxpayer's identity.

Part II of this article describes the components of Shavell's theory and explains the Shavellian boundary. Parts III through V provide examples of exo-Shavellian substantive rules: rules that breach the Shavellian boundary by being superior to their optimal tax substitutes. Part III explains how a tax on an activity that is complimentary with leisure improves even an optimal income tax. Part IV demonstrates how anti-majoritarian protections may have a redistributive nature that makes them superior to the rule that the majority would impose. Part V shows that substantive rules may produce signaling equilibria that have redistributive effects that cannot be obtained by even optimal tax rules. Part VI concludes.

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exocrine glands (that do not secrete to internal organs), exosphere (outside the atmosphere), exoskeleton (a skeleton outside the body).

II. THE SHAVELLIAN BOUNDARY

Shavell's thesis rests on two fundamental economic principles. The first is the realization that taxes on specific activities or goods tend to be undesirable because they distort the market for those activities, as well as for their supplements and complements.[9] The second, more direct foundation applies the former observation, but considers not just activities that produce income, but also distortions in the market for activities that produce enjoyment directly: leisure. The first principle favors an income tax over sales taxes on various activities. The second reveals that no income tax is perfect, because it creates a bias in favor of leisure, particularly among the most skilled individuals.[10]

Shavell brought these principles to bear on the desire to produce some degree of income equality. The thesis requires the reader to suppose that the ideal shape of the legal rule in question has been established. The issue becomes how to evaluate changes for the purpose of redistribution. The question's very definition leads to the answer. Since it is given that the rule is ideal, any proposed changes to the rule could not improve its substance. Because the changes have redistributive purposes, Shavell compares them to an incremental amount of taxation that produces the same amount of redistribution.

That the redistribution achieved by the rule change is equal to the redistribution achieved by an incremental tax is a central component of Shavell's argument. It is also an assumption. While, as an assumption, it is proper, it also limits the thesis to those redistributive changes that have tax-based substitutes. The effect of this assumption is central for the present article. A second central assumption of Shavell's thesis is that the equivalent tax is optimal.

The components of Shavell's thesis are in place. First, a rule has the optimal form. Second, the change to be evaluated is motivated by redistribution. Third, an incremental tax that produces the same redistribution as the proposed rule change is feasible. Finally, that incremental tax is optimal. The conclusion is unavoidable. The optimal rule accompanied by an optimal tax is necessarily superior to changing the rule, because any

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[9] The analysis of optimal taxation is more nuanced but the small size of its deviation and the complexity of its administration argues in favor of equal taxation. The intuition that all taxes on commodities and activities should be equal was actually rebutted by Ramsey who showed that taxes should be "such as to diminish the production of all commodities in the same proportion." F.P. Ramsey, *A Contribution to the Theory of Taxation*, 37 ECON. J. 47, 54 (1927).

[10] Again, the analysis of optimal taxation is more nuanced. A closer reading indicates that in a society with no taxation, a significant fraction of society would forego work; taxation restores their incentive to work. *See* J.A. Mirrlees, *An Exploration of the Theory of Optimal Taxation*, REV. ECON. STUDIES 175, 201 (1971) ("only men for whom $n > x^0$ [i.e., having skill above some level,] actually work").

change would lead to a substantively inferior rule and would impose a sub-optimal burden as a quasi tax. In other words, changing the rule is likely to cause two distortions compared to the ideal of both an optimal rule and optimal tax. The first distortion is that the rule will no longer be optimal, and the second distortion is that its effect as a tax will not be optimal. Characteristically, Shavell's argument is also called the double-distortion argument.

The conclusion of Shavell's theory allows some arguments for legal change to be considered improper or false. Arguments motivated by redistribution are improper because redistribution is achieved better by taxes. This conclusion can be considered akin to setting a boundary in legal argumentation. Arguments for substantive rule changes are "out of bounds" if they are motivated by redistribution.

This article explains three likely exceptions, offered as evidence that the Shavellian boundary is permeable. Redistribution alone justifies (i) excess liability on accidents from a leisure activity; (ii) rights to conduct distasteful to political majorities, such as abortion[11] or gun carrying in some jurisdictions; and (iii) rules that produce signals of skill, such as a physical housing subsidy. Parts III through V below argue that the redistribution these types of substantive rule changes produce is better than what would be possible using taxation.

III. JUDGMENT-PROOF LIABILITY BURDENING LEISURE

The theory of optimal taxation considers as a standard result that tariffs or use taxes are suboptimal because they distort the choice of conduct.[12] A tariff or use tax reduces demand for specific commodities or services, whereas optimality can be achieved only if the supply of, and demand for, commodities and services is determined by the market without distortions. For example, a tariff on boating would reduce demand for boating and related goods, and it would increase demand for some substitute activities, which would not have occurred if boating were available without the tariff.

In exceptional cases, however, tariffs may improve an income tax system. Because the enjoyment from leisure is not subject to an income tax, the unavoidable drawback of any income tax system is that it induces leisure. Thus, the optimal income tax has the sub-optimal effect of reducing work and increasing leisure. Consequently, a tariff on activities that correlate with leisure can increase the efficiency of an optimal income

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[11] Roe v. Wade, 410 U.S. 113 (1973); *modified in* Planned Parenthood of Southeastern Pennsylvania v. Casey, 505 U.S. 833 (1992).

[12] *See generally* David E. Wildasin, *Distributional Neutrality and Optimal Commodity Taxation*, 67 AM. ECON. REV. 889 (1977).

tax by reducing the inducement toward leisure that is created by the tax. The same result can also be achieved by subsidizing a non-discretionary activity, such as housing.[13] Shavell and Kaplow concede that this is an exception to their theory.[14]

The liability system can reduce the distortions caused by the optimal tax even more effectively than a tariff on activities complementary with leisure. Whereas a tariff would distort demand generally, and may even have counter-redistributive effects,[15] the fear of liability does not fall on those who are judgment proof. Judgment-proof individuals can avoid their unpaid liability through bankruptcy's fresh start. As a result, a substantive rule change creating excess liability for leisure activities offers an improvement over a tariff on the same activities. Poor individuals can engage in the activity because they do not have to pay a tariff, and they are not deterred from engaging in the activity by the excess liability because they are judgment-proof.

An example illustrates. Assume that a society is comprised of individuals with various levels of skill and corresponding incomes. Without any income tax, individuals in aggregate would devote some fraction of their time to labor and the remaining to leisure. An optimal income tax burdens all individuals and has its chilling effect, leading individuals to reduce labor in favor of leisure.

Suppose that an activity exists that correlates perfectly with leisure and that can be subject to either a tariff or excess liability. In an exchange on this topic, Sanchirico and Kaplow & Shavell use as an example of a leisure activity "boating"[16] and, for the sake of consistency, I will follow this precedent despite the fact that some caveats are necessary: For example, the tariff on boating or the excess liability for boating accidents must

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[13] *See, e,g.*, Helmuth Cemer & Firouz Gahvari, *Uncertainty, Optimal Taxation, and the Direct versus Indirect Tax Controversy*, 105 ECON. J. 1165 (1995).

[14] In a brief comment on optimal tax, Kaplow and Shavell concede that superior alternatives to the optimal income tax exist:

> [T]axes or subsidies on particular commodities might have indirect effects that reduce the distortion of an income tax. In particular, by taxing complements of leisure and by subsidizing substitutes, one can reduce the labor-leisure distortion and thereby improve welfare by more than the inefficiency that results from distorted purchases of the taxed or subsidized commodities. ... Thus, although a complete and sophisticated analysis does not demonstrate that it could never be efficient to change legal rules from what narrowly seem to be the most efficient ones, there is no general argument for adjustments of a conventionally redistributive type.

Redistributing, *supra* note 1, at 680-81.

[15] A fixed tariff, or a tariff comprised of a fraction of the activity's expenses, would have counter-redistributive effects by deterring those who could least afford the tariff from engaging in the activity. On the other hand, a tariff comprised of a percentage of the participant's income (so as to more accurately off-set the effects of the income tax) would not have the counter-redistributive effect.

[16] Chris William Sanchirico, *Taxes Versus Legal Rules as Instruments for Equity: A More Equitable Approach*, 29 J. LEGAL STUD. 797 (2000); *Clarifying*, *supra* note 1 (responding to Sanchirico).

exclude boating for vocational fishing or transportation; the example would be inapt in Venice or the Greek archipelagos but apt, perhaps, in a landlocked state with boating on lakes or rivers that is mostly recreational. Also, the intuition is clearer if boating is the only possible leisure activity, so that individuals who are deterred from boating by the tariff or the extra liability cannot turn to other, substitute leisure activities.[17]

According to optimal tax theory, a tariff on boating may improve the optimal income tax.[18] By deterring leisure, it increases labor, partly offsetting the chilling effect of the income tax. Even though individuals react to the tariff by reducing leisure, making receipts from the tariff lower, their increased labor compensates for that effect by causing individuals who reduce leisure to earn more income and pay higher income tax revenues. The revenues from the income tax plus those of the tariff therefore exceed the revenues of the optimal income tax alone.

Compare this optimal tariff to the imposition of excessive liability on the accidents from boating. Because all individuals have some probability of causing accidents if they engage in boating, the probability-adjusted excess liability is akin to a tariff. If debts could not be discharged in bankruptcy and no judgment-proof debtors avoided payment of their liability, the result would be identical to that of the tariff. In actuality, however, the less wealthy segment of society can avoid this liability through bankruptcy or merely by being judgment proof. The result is that the danger of liability produces its disincentive unequally. The wealthy (and productive) segment of society faces a deterrent from boating (and leisure) that is greater than that faced by the less wealthy segment of society. This difference makes excess liability on a leisure activity a likely superior addition to a regime of optimal income taxation.[19]

IV. MINORITY-PROTECTIVE MAJORITY-DISTASTEFUL RIGHTS

Some activities may be distasteful to the majority while strongly desirable to a minority. In certain regions of the country, the possession of firearms or the availability of abortion may be apt examples. There is some evidence that the strongest benefit from the possession of firearms accrues to the physically weakest segment of society.[20] For the majority, however,

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[17] If substitute leisure activities exist the results are weaker but still hold. The results are weaker to the extent that those who are deterred from boating will engage in the substitute leisure activities. The result still holds, however, if not all of the deterred boating time is spent on substitute leisure activities but some is spent on labor.

[18] *See supra* note 14.

[19] Furthermore, the actual tariff may have counter-redistributive effects, deterring the consumption of leisure by the less wealthy disproportionately more than that by the wealthier.

[20] Defending oneself from crime without a firearm is a dominated strategy for either sex, but some evidence indicates that men experience only a small change in their rates of injury if they use a firearm

any protective benefit may be outweighed by distaste for firearms. Similarly, there is reason to believe that the strongest benefit from access to abortion accrues to the poorest, sexually active, teenage girls rather than to a majority of society.[21] For a majority (in certain jurisdictions) with a strong distaste for abortion, its availability would be harmful when benefits to the minority are outweighed by costs to the majority. As no market exists for the minority to compensate the majority for either "harmful" practice (firearm possession or abortion), the optimal rule under standard economic calculation appears to be a prohibition of the activity. Nevertheless, a rule of greater authority, such as a Constitutional provision or interpretation that prevents the nominally optimal rule from materializing, is desirable from a redistributional perspective. An example illustrates.

Assume that a society consists of 100 individuals. All prefer being educated to being illiterate. They divide into two sub-groups, one whose members achieve high utility with education (H)—i.e., a large net welfare gain from greater capacity for earning and leisure after educational costs in money, effort, and opportunities—and another whose members achieve less high utility with education (L). There are 35 high types, H, and each achieves a utility of 30 from education. There are 65 low types, L, and each achieves a utility of 20 from education. Receiving no education—i.e., being illiterate—corresponds to a utility of 10 for both H and L types.

This society is plagued by a type of accident, teen pregnancy, which prevents individuals from receiving education. Suppose that teen

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to defend themselves against crime (from 4.85% to 3.51%). Women, on the other hand, experience a more significant drop in their rate of injury when using a firearm to defend against crime (from 3.08% to 1.25%). In this particular comparison, the data reach statistical significance, although if defending without a firearm is included, then it does not. *See* Lawrence Southwick, Jr., *Self-Defense with Guns: The Consequences*, 28 J. CRIM. JUSTICE 351-370 table 6 (2000). The example would be supported more vividly if the evidence distinguished between average men and women and weak or elderly men and women, and showed that the latter receive a greater benefit from firearm possession, but for the purposes of this example, I assume these conclusions to be valid.

[21] Evidence supports the hypothesis of the text that the availability of abortion increases the opportunities for schooling in minorities (read "in the disadvantaged" according to the main text) and little effect in the majority (read "those having large wage gains from education" according to the hypothesis of the text), *see generally* Joshua D. Angrist & William N. Evans, *Schooling and Labor Market Consequences of the 1970 State Abortion Reforms*, NBER Working Paper W5406, *available at* http:// ssrn.com published in 18 RESEARCH IN LABOR ECONOMICS 75 (S. Polachek, ed., 1999); similar results are reported by Adam Ashcraft, *Identifying the Consequences of Teenage Childbearing*, *available at* http://ssrn.com. The choice to not have a potentially desirable (in-wedlock) pregnancy in the face of increased difficulty of obtaining an abortion is documented, along with a thorough review of the literature, by Thomas Kane & Douglas Steiger, *Teen Motherhood and Abortion Access*, 111 Q. J. ECON. 467 (1996). The choice to travel to states with liberal abortion laws before the universal legalization, is used to determine the benefit due to the availability of abortion, *see generally* Timothy A. Deyak & V. Kerry Smith, *The Economic Value of Statute Reform: The Case of Liberalized Abortion*, 84 J.POL. ECON. 83 (1976).

pregnancy occurs with a probability of 20%. Accordingly, 7 of the high type individuals and 13 of the low type individuals would become pregnant and would not become educated unless they underwent an abortion. The aggregate utility cost from not educating any of these individuals would consist of the foregone utility of the 7 H individuals who each miss a gain of 20 (for a cost of 140), plus the foregone utility of the 13 L individuals who each miss a gain of 10 (for a loss of 130). The loss of both types sums to 270.

Further assume that abortion causes social displeasure of 280, or 2.8 per person. Thus, a ban of abortion costs 270 in foregone gains from education but saves harm of 280, and appears to be desirable. This calculation, however, ignores the counter-redistributive effect of the ban. Without the ban, individuals attain two levels of welfare. With the ban, some individuals attain a third, lower level, causing an increase in wealth inequality that itself tends to cause social displeasure. The average welfare appears to be higher with the ban only by ignoring any displeasure that arises from the greater wealth inequality caused by the abortion ban. If the increased inequality increases social discomfort by more than 10, or 0.1 per person, then the ban actually decreases welfare.

To state the model in the abstract, consider that the society consists of two types of individuals, high and low, symbolized by H and L. The individuals differ on how much their welfare increases by education. Welfare or utility is symbolized by u and depends upon each individual's type (high or low) and whether or not each receives education. Both type and education level are denoted by subscripts, with u_i corresponding to the welfare of uneducated or illiterate individuals. Educating a high-type individual (H) enables her to reach welfare u_H, rather than remain at u_i. Educating a low-type individual (L) results in a smaller gain, but her welfare reaches u_L. Thus, the welfare of educated low-type individuals is less than that of the educated high-type individuals, i.e., $u_i < u_L < u_H$. The probability of teen pregnancy is p. The fraction, or density, of high-type individuals is d_H, and $1\text{-}d_H$ is the density of the low type individuals. The displeasure, per person, of the use of abortion is c_A. And, the incremental displeasure from the counter-redistributive effect of its ban is c_B. The society seeks to maximize average welfare. The average welfare loss under the ban is symbolized by O_B, and is:

$$O_B = pd_H(u_H\text{-}u_i) + p(1\text{-}d_H)(u_L\text{-}u_i) + c_B\,. \qquad (1)$$

According to our example, the first two terms in the equation above amount to an average loss of 2.7 per person. The average welfare loss without the ban is symbolized by O_w and is:

$$O_w = c_A \ . \qquad (2)$$

According to our example, that was an average loss of 2.8 per person. All individuals would be educated and the baseline redistribution would take place. The ban appears desirable provided its immediate costs are smaller than the displeasure from abortions, i.e., if:

$$pd_H(u_H-u_i) + p(1-d_H)(u_L-u_i) < c_A \ . \qquad (3)$$

Despite the apparent desirability of the ban, however, it is undesirable provided that the disutility from abortions is smaller than the total disutility from the ban, including the displeasure that results from the incremental counter-redistributive effect, i.e., if:

$$c_A < pd_H(u_H-u_i) + p(1-d_H)(u_L-u_i) + c_B \ . \qquad (4)$$

It is important to note that this example is one of a desirable rule—the ban against abortion—that becomes undesirable when its redistributive effect is taken into account. In the United States, several individual states banned abortions until the U.S. Constitution was interpreted to prohibit such bans.[22]

As our exploration of the Shavellian boundary continues, the prohibition of the ban must be compared with its optimal tax substitute. In this setting, though, a tax can never be equal to the prohibition of an abortion ban. The remedy is costless, and no other cure is available. Neither could the increased welfare be taxed. First, only part of it is monetary. Second, even if it were all monetary, and that entire gain could be captured by a tax, giving that amount to those offended by the remedy would be insufficient. By definition, their harm exceeds the monetary gains. Since no tax substitute is available, the prohibition of abortion bans is an exo-Shavellian rule in the circumstances described above.

The relaxation of other simplifying assumptions strengthens the conclusions of the model. If the decision to ban abortion is made by the vote of an electorate that is mostly already educated, they are likely to ignore the next generation's distributional consequences.

A further aggravation of the ban's distributive effect appears if we make the plausible assumption that skill may influence the probability of pregnancies. Then, the more skilled teen girls avoid pregnancies anyway and benefit little from the ban. If pregnancies occur predominantly to the less skilled teens, they bear disproportionately the burden of the ban. The

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22 *See supra* note 11.

effect, then, of the ban is not that some skilled and some less skilled remain uneducated but only that some of the less skilled remain uneducated, producing a greater disparity of wealth.

Under the specifications of the model, no substitute remedy existed. But, in fact, governmental policies may be able to restore educational capacity without abortion. A rule could require every educational institution to provide full daycare services, for example, which the government would fund with an optimal tax. In either case, even if the consequence is a complete recapture of the redistributive gain of *Roe*, an additional cost exists, the chilling effect of the additional tax to fund the daycare centers.

Available empirical evidence supports the model's conclusions. One study compares the effect of *Roe v. Wade*'s prohibition of abortion bans on disadvantaged groups: groups disproportionately comprised of low-type individuals. The prohibition of abortion bans improved their educational attainment more than it influenced that of the general population.[23]

V. SIGNALING ARRANGEMENTS

The actions of individuals may send signals about their capacities. One of the great drawbacks of any income taxation system is that it does not have the ability to tax capacity and is limited to taxing only realized income, letting able individuals avoid taxation by consuming leisure. An optimal income tax system would be improved if it extracted information about individuals' abilities. Then, abilities would command greater taxation and lack of ability would lead to lower tax or to subsidies. However, the tax system does not have the capacity to verify individuals' representations about their own ability. If the tax system were to ask individuals about their ability, able individuals could plead inability and ask for low tax rates or subsidies. However, economic theory suggests that circumstances may arise that induce the transmission of truthful signals. Their analysis is the object of *signaling theory* and its holy grail is *separating signaling equilibria*, i.e., settings that induce actors to separate according to their attributes by choosing different conducts.[24]

A legal regime may establish an environment that induces individuals to signal their ability—that is, produce a separating signaling equilibrium. If the result of this signaling equilibrium is desirable from a redistributive perspective, it is superior to an optimal tax substitute.

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[23] *See supra* note 21.

[24] The signaling literature falls under the general topic of the economics of information and uncertainty. Despite the plethora of research papers on the topic, few introductory works exist. *See, e.g.*, INES MACHO-STADLER & J. DAVID PEREZ-CASTRILLO, AN INTRODUCTION TO THE ECONOMICS OF INFORMATION: INCENTIVES AND CONTRACTS (Richard Watt trans., Oxford University Press 1997).

An example illustrates. Assume that the employment of individuals is divided into periods: one "just hired" period and one or more "veteran" periods. Individuals divide into two types: high and low skill. Low-skill individuals are one half of the population, and high-skill individuals are the other half. Although skill determines productivity, an individual's skill cannot be communicated credibly to prospective employers. Employers find out an employee's skill only at the end of the first, just hired, period.

In an attempt to further redistribution, the government awards the visible benefit of housing to individuals with low income.[25] Moreover, only individuals with low skill find the benefit attractive.

Employers may then treat the benefit as a revelation of skill and award the high wages to individuals without the benefit and low wages to individuals who take the benefit. While this would tempt individuals to decline the benefit so as to obtain the high wage, this is not an appealing strategy because the employer will soon recognize the low skill and terminate the employment relation.

The subsidy achieves a redistributive goal directly. Moreover, it does not chill productivity, because the subsidy creates a separating equilibrium that reveals skill. An example illustrates.

Each period, high-skill individuals earn wages of 100 and low-skill individuals earn wages of 50. The housing subsidy is 20, and it is financed by a tax of 20 on the earnings of the high-skilled, which then drop to 80. In order to obtain the housing subsidy for any period, each individual would have to accept it before the beginning of the first employment period. A worker who incorrectly signaled high skill before the first period would be disqualified from receiving the subsidy in the second. Both high-skill and low-skill individuals are assumed to work the same amount of time during each employment period.

High-skill workers do not have an incentive to send a false signal. If skilled workers were to ask for the subsidy before starting to work, as soon as their high skill would be revealed and their wage would rise to 100, they would no longer qualify for the subsidy. Thus, they would enjoy one period of low wages and subsidy, or earnings of 50+20=70. The second period, they would be taxed and enjoy earnings of 80. By contrast, if they refused the subsidy and signaled their high skill, they would enjoy two periods of 80. (For simplicity, the discount rate is set at 0.)

Workers of low-skill also prefer not to send a false signal. If low-skill workers were to decline the subsidy, they would only receive the high wage for one period, receiving, net of taxes, 80. At the end of the first period, the employer would re-classify the worker as low-skill, and the worker would receive the low wage in the second period. Because qualification for the housing subsidy must occur before the first employment period, however,

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[25] For reasons I will discuss, only the provision of subsidized physical housing, as opposed to a cash payment, will satisfy the requirements of a substantive rule that breaches the Shavellian boundary.

this individual would not qualify for the subsidy. The worker therefore earns only 50 in the second period, and the two-period total would be just 130. Instead, a low-skill worker would accept the subsidy before the beginning of the first employment period and enjoy earnings of 70 in each of two periods, for a total of 140.

Modeling the example allows its necessary conditions to be specified and clarified. Again, the model has two periods. The employer pays wages in each period, but in the second period the skill of employees has been revealed. Individuals divide into high and low types (H or L), and would obtain wages w_H or w_L, respectively, under perfect information. The subsidy has size s and has as its conditions that the recipient's income is low (w_L) and that the individual signaled truthfully in the first period. A high wage is burdened by a tax that finances the subsidy and depends on the proportion of the population, r, that has low skill. The resulting tax that burdens the high wage is:

$$x = r \cdot s/(1 - r) .^{26} \qquad (5)$$

Equilibrium requires that low-type individuals have an incentive to be truthful. Individuals of low type might have the incentive to pretend to have high skill to employers so as to obtain one period of high wage ($w_H - x$). If they did so, they would receive the high wage in period one, but they would receive the low wage in period two and forfeit the subsidy. Their total earnings would be $w_H - x + w_L$. If they acted truthfully in the first period, their total earnings would be $2 (w_L + s)$. To have the incentive to be truthful, individuals of low skill must prefer the latter income. For deception not to be attractive, the following inequality must hold:

$$2 (w_L + s) > w_H - x + w_L . \qquad (6)$$

Solving the above for s, reveals that individuals of low type would be truthful if:

$$s > (w_H - w_L - x)/2 . \qquad (7)$$

In other words, the subsidy must be greater than half the excess after tax earnings of high-skill types compared to low skill types. By

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[26] Its derivation is easiest by assuming that the population is known to be n. Since a fraction r receives s, their aggregate subsidy is $n \cdot r \cdot s$. The remaining population, n (1-r), must raise the amount that solves for x the equation $n \cdot r \cdot s = n (1 - r) x$.

substituting the definition of the tax x from equation (5), we obtain a more definitive figure:

$$s > \frac{(r - 1)(w_H - w_L)}{r - 2} \qquad (8)$$

In the simplified case where the population segments are equal, and, therefore, the subsidy is equal to the tax and $r = .5$, then the subsidy must be greater than one-third of the difference between the two wages for low types to have the incentive to be truthful.

For the separating equilibrium to be maintained, the high-type individuals must also not prefer to pretend to be of low type so as to receive the subsidy. Truthful individuals of type *H* are assured of two periods with high wages, a total income of $2 (w_H - x)$. Taking the subsidy and the low wage in the first period will not prevent the employer and the government from finding they are high types, leaving $w_H - x$ as their sole income in the second period. Consequently, total income in both periods is $w_L + s + w_H - x$. To have the incentive to be truthful, individuals of high type must prefer the former income. For the deception not to be attractive, the following inequality must hold:

$$w_L + s + w_H - x < 2 (w_H - x) \ . \qquad (9)$$

Solving for x, after substituting s by its expression as a function of the tax, which is $s = x(1 - r)/r$, reveals that individuals of high type will be truthful if:

$$x < (w_H - w_L) r \ . \qquad (10)$$

In other words, for the individuals of high skill to have the incentive to be truthful, the subsidy must be smaller than the low-type's fraction of the difference between the two wages. A greater subsidy would not make sense, as it would allow the low skilled workers to enjoy greater total earnings than those of high skill.

Notice that the conditions for truthfulness of both groups can be satisfied. The example used a subsidy that was greater than a third of the difference between the wages and, while the low types fraction was half, a tax that was smaller than half the difference between wages. It was large enough to induce truthful signaling by individuals of low type and small enough to prevent individuals of high type from attempting to get the subsidy.

The signaling model shows, however, that only the visibility and verifiability of a non-tax rule can render it superior to a tax rule. If

employers cannot verify which candidates waive the subsidy, then the employers cannot use that information to distinguish the skill of employees and the separation unravels. Both types of employees would be offered the average wage, 75, by the employer in the first period. Moreover, the subsidy cannot be based on wage, since all employees have the same income in the first period.

A physical housing subsidy would satisfy the verifiability criterion of the substantive subsidy rule, as verifiability would be possible by checking the physical address of the employee. A monetary subsidy, on the other hand, which would result from a pure tax rule, would be easy to conceal, leading to the collapse of the separating equilibrium. Unlike abortion, tax law can emulate the outcome of substantive law by announcing the recipients of subsidies. Unless tax law does this, however, the substantive rule is superior.

VI. CONCLUSION

By identifying three potential violations of the Shavellian boundary, this article calls for empirical research to determine the exact contours of each violation in practice. To the extent that these violations are confirmed, the normative implications are manifest. Excessive tort liability should be brought to bear on activities that are synergistic with leisure, and jury instructions in the determination of punitive damages should include a relation of the injury to leisure as an aggravating circumstance. The interpretation of the constitutional protections of the Second Amendment and *Roe* should become more cognizant of the minority groups that receive their greatest benefits. Firearm purchase waiting periods and lock requirements should perhaps have exceptions for elderly purchasers and parental notification requirements for abortions should be reconsidered as being inimical to young women, who are the minority group that benefits most from *Roe*. Finally, a physical housing subsidy may be preferable over a voucher subsidy.

By identifying three sources of Shavellian boundary violations, this Article also demonstrates its permeability and lack of complete generality. While these three exceptions (and the collection of others referenced in footnote 3) may not appear to be exceptions of a phenomenon with generality, they are results of a limitation of a boundary that heretofore has been viewed with generality. From the perspective of economic theory, these examples exploit an assumption that restricts Shavell's thesis to redistributive rules that operate on monetary thresholds. From the perspective of legal theory, this does reveal one general exception to the Shavellian boundary. All rules with a non-monetary redistributive effect are potentially superior to the combination of the otherwise optimal rule and an optimal tax. This Article offered the examples of rules that improve optimal taxation, create welfare in minorities that the majority would

choose to eliminate, and allow signaling arrangements that a pure tax system could not. Others have offered rules that remedy tendencies for errors,[27] or the satisfaction of preferences by altruistic means,[28] and so on. This should be an unsurprising conclusion. Taxation operates on a small number of variables, essentially income and transaction price. Substantive rules operate on an array of conditions and caveats. Therefore, taxation is an instrument that is not likely to emulate the sophistication of substantive rules.

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27 Jolls, *supra* note 3.

28 Calabresi, *supra* note 3.